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The Ring-legged Earwig,

Euborellia annulipes (Lucas)

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THE RING-LEGGED EARWIG,
Euborellia annulipes (Lucas)

A New Greenhouse Insect in Ohio

C. R. NEISWANDER

INTRODUCTION

In March 1937, injury of an unusual nature occurred on Scarlet Globe radishes in a 4-acre greenhouse near Elyria, Ohio (7). The damage consisted of feeding pits, which varied from slight surface wounds, in which only the colored surface of the radish was removed, to excavations as much as three-eighths of an inch deep (fig. 1). The damage was sufficiently widespread to cause considerable commercial loss. Investigation revealed that the injury was caused by a species of earwig.

Fig. 1.—Radishes injured by ring-legged earwig

Specimens sent to the United States National Museum were determined by A. B. Gurney as *Euborellia annulipes* (Lucas), a species that had not been recorded previously in Ohio. Heretofore, for the most part, the insect has been considered beneficial because of its known habit of feeding on other insects, some of which are injurious to plants.

The manner in which the ring-legged earwig was introduced into Ohio is not known. It is possible, however, that it may have been transported in materials shipped from the Gulf States. The grower in whose greenhouse the insect was first observed had no recollection of having received packaged plants or other material from the Southern States. Nevertheless, this seems to be the most logical explanation for its occurrence.

DISTRIBUTION

Reference to the literature indicates that the ring-legged earwig is widely distributed throughout the world. According to Buckell (2), "it has been recorded from France, Italy, England, North America, Mexico, Bermuda, Ceylon, Algeria, and probably occurs in many other countries."

In the eastern and southern United States, the species is said to be established along the seaboard from North Carolina to Texas, and, in addition, it has been reported from Massachusetts, Connecticut, Pennsylvania, and the District of Columbia. On the Pacific Coast it occurs commonly along the coast of Southern California and at Victoria on Vancouver Island, British Columbia. Mr. Gurney stated in a letter that this earwig has been reported from about 20 states, among which were Iowa and Kansas in the Middle West. Recently (4) it has also been recorded in Nebraska.

The insect has been observed in Ohio in two vegetable greenhouses, one of which is located at Elyria and the other at Cincinnati. The Cincinnati collection was made by Dr. Charles H. Martin in September 1941. In the Cincinnati area no injury to vegetable crops has been observed.

In the Elyria greenhouse the earwigs were most abundant and caused most of the injury along the middle concrete walk and near steam lines. The soil in this house has been steam sterilized by the tile method each summer for a number of years. It is probable that imperfect sterilization near the concrete walks permitted some of the earwigs to escape and that later these sought the warm areas near the steam lines.

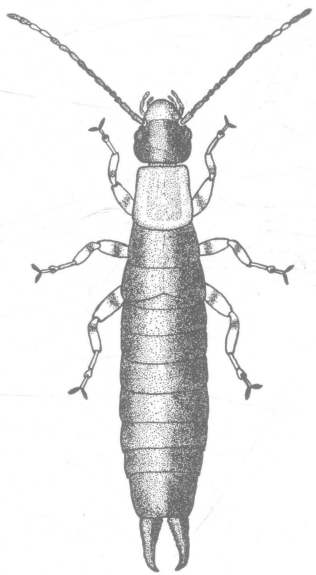

Fig. 2.—Adult female

According to Blatchley (1) about 400 species of earwigs have been described. Most of these occur in tropical and semi-tropical countries. Nine species have been reported in Florida and three in Indiana. The three species found in Indiana are *Labia minor* (L.), *Doru aculeatum* (Scudder), and *Vostox brunneipennis* (Serville). These occur in Ohio also and are represented in the collection of the Ohio State University. *Labia minor* (L.) has been taken in both of the greenhouses in which *Euborellia annulipes* (Lucas) occurred. The former species, however, has never accumulated to significant numbers and has not been observed to cause injury to crops.

DESCRIPTION

The Adult.—The adult insects are ½ to ⅝ inch long and 1/10 to ⅛ inch wide. The females are slightly larger than the males. The sexes can be distinguished readily from the structure of the forceps at the posterior end of the body (figs. 2 and 3). In the male the right branch of the forceps turns sharply inward near the tip. The upper surface of the body of both males and females is dark brown to blackish in color with the under surface and the legs somewhat

paler. There is a dark band around the middle of the femur and tibia of each leg. It is due to this band that the insect received the name, the ring-legged earwig. From our observations the species is entirely wingless. Williams (10) makes the statement that the "species is wingless (almost invariably)."

Fig. 3.—Forceps of adult male

The technical description given by Buckell (2) is as follows: "Medium sized, black, shining; head black; antennae 15-16 jointed, with basal segments reddish, the rest greyish brown, except the two penultimate segments, which are whitish. Pronotum broad as the head, sometimes paler in color, quadrate; elytra and wings usually entirely absent. Abdomen with sides more or less parallel with no tubercles on the sides of the second and third segments. Last dorsal segment larger than the others, slightly impressed in the middle. Feet testaceous, the femora banded with black, as are also the tibiae. The depth and intensity of this banding varies considerably. Branches of the forceps in the male remote at the base, stout, strongly curved, the right branch crossing above the left at the apex; in the female the branches are straight, conical, sub-contiguous; total length 12-16 mm."

The Egg.—Eggs when first deposited are nearly spherical in shape and are about three-fourths of a millimeter in diameter. As the embryo develops the egg elongates to assume the shape of a somewhat asymetrical ellipsoid and measures about 1¼ millimeters through its longest axis. With the approach of the hatching period, the body of the developing embryo may be seen through the transparent shell. The prominent, dark pigmented areas shown in the photograph (fig. 4) are the developing eyes of the insect.

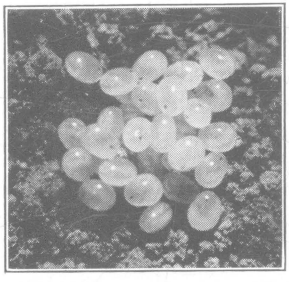

Fig. 4.—Egg cluster of ring-legged earwig

(enlarged 12 diameters)

The Young.—The young earwigs, except for size, are similar to the adults in general appearance. The early instars can be differentiated, however, by the number of segments in the antennae. The nymphs of the first instar have 8 segments; those of the second, 11; the third, 13; and the fourth, usually 14. The number of segments of the antennae of the fifth- and sixth-instar individuals vary from 14 to 17. Usually, in the first two instars the next to the last segment of each antennae is white. In the third instar, the third to the last segment is usually white and sometimes the next to the last is also. In the last three instars there may be one, two, or no white segments. When white segments are present, they are usually the twelfth and thirteenth, but any of the segments from the tenth to the thirteenth may occasionally be white.

The forceps in the first five instars of both sexes are similar in shape to those of the adult female. The hooked right branch of the forceps in the male appears at the fifth molt, which marks the beginning of the adult stage. The adult males can, therefore, be differentiated from the fifth-instar individuals, as well as from adult females, by the hooked forceps. The adult females can be distinguished readily by the fact that only eight segments of the abdomen are apparent; whereas in the nymphs and adult males there are 10.

LIFE HISTORY

Under greenhouse conditions, eggs of the ring-legged earwig are deposited in groups or clusters in depressions in the ground underneath small masses of manure or other debris. A clutch is not deposited all at once but usually over a period of about 3 days, and, as might be expected, the hatching period of each cluster extends over a similar length of time.

During the winter of 1937-1938 a group of 10 females, which were observed in the laboratory throughout the oviposition period, produced 39 egg clusters which contained a total of 1,259 eggs. The complete oviposition record for this group is given in table 1.

The maximum number of eggs in a cluster was 65; the minimum was 9; and the average of all clusters was 32. The maximum number of eggs deposited by a single female was 186; the minimum was 69; and the average of all 10 females was 126. It may be noted that the number of eggs per cluster was largest in the first cluster and tended to decrease with each succeeding one. The number of clusters deposited by a single female varied from two to seven with an average of three and nine-tenths. A female not included in this group produced four clusters which contained 110, 64, 45, and 19 eggs, respectively, a total of 238.

The eggs hatched in 10 to 12 days under laboratory conditions at a temperature of 75° F. The second cluster of eggs was deposited usually about 10 days after the first mass of eggs had hatched. It may be noted from table 1 that successive egg clusters were about 3 weeks apart.

Eighteen earwigs under observation throughout the entire growth period required an average of 73.4 days to reach the adult stage (tables 2 and 3). The shortest period observed from egg to egg was 87 days, and the average was about 4 months. In the greenhouse, different stages of the insect were present at all times of the year.

GENERAL BEHAVIOR

The ring-legged earwig is an interesting species to observe from the standpoint of insect behavior. It displays a strong development of instinctive reactions that are of considerable importance to the propagation and survival of the species. Its tendency to secrete itself in crevices and among debris makes it amenable to wide distribution through transportation facilities.

When the eggs of a cluster have been deposited, the female guards them until they hatch. If the eggs are scattered, she at once gathers them into a pile and hovers over them. In her constant handling of the eggs she keeps them bright and clean at all times. If an egg becomes injured or is infertile the mother eats it.

Eggs which are removed from the female parent and are placed with another female or a male usually disappear within a short time. When isolated completely, they are commonly attacked by mold and rot organisms and fail to hatch. No egg has ever been seen to mold or rot when the mother is present. The mother's care of the eggs thus seems to be of value to the species as a means of protection from predaceous and parasitic organisms. However, the fact that earwig eggs, as well as both young and adult earwigs, are eaten by other earwigs probably serves to keep the species from accumulating to prodigious numbers.

TABLE 1.—Oviposition record for 10 female earwigs

Earwig No.	1st cluster		2nd cluster		3rd cluster		4th cluster		Total eggs
	Date	No. of eggs	Date	No. of eggs	Date	No. of eggs	Date	No. of eggs	
1	Dec. 6-9	51	Dec. 30–Jan. 3	33	Jan. 17-21	39	Feb. 10-12	48	171
2	Dec. 11-14	50	Jan. 9-11	16	Feb. 1-2	32	Feb. 23	10	149*
3	Dec. 4-7	65	Jan. 28-30	35	Feb. 20-23	45	(Missing Mar. 3)		145
4	Dec. 18-20	37	Feb. 4-8	32	(Died Mar. 7)				69
5	Dec. 21-23	62	Jan. 20-22	40	Feb. 10-13	30	Mar. 17-19	28	186†
6	Dec. 21-22	46	Feb. 12-14	42	(Died Mar. 31)				88
7	Dec. 21-23	37	Jan. 28-29	23	Feb. 18-20	27	Mar. 27-31	18	105
8	Dec. 26-28	65	Jan. 30-Feb. 4	41	Mar. 2-5	40	Mar. 25-29	25	171
9	Dec. 29-31	30	Jan. 31-Feb. 1	24	Mar. 13-14	21	(Died Apr. 7)		75
10	Dec. 28-30	34	Feb. 11-12	22	Mar. 14-15	15	Apr. 2 8	8	100‡

*A fifth cluster of 9 eggs was deposited by this female April 2, a sixth cluster of 23 on April 14, and a seventh cluster of 9 on April 29.
†A fifth cluster of 26 eggs was deposited April 19.
‡A fifth cluster of 21 eggs was deposited May 2.

When the eggs of a cluster have all hatched, the female ceases to exhibit maternal concern for her progeny, although the individuals of the brood are tolerated without interference for a period of about 10 days. During this period they are compelled to seek their own food and protect themselves from whatever enemies they encounter. After the female deposits a succeeding egg cluster, any insect that approaches the eggs is attacked viciously. Even her own young of an earlier hatch are driven away or killed. Any insect that can be seized with the forceps is killed and eaten. In several instances, when the first brood was left with the mother, only two or three individuals from a brood of 40 or 50 survived by the time the second brood had hatched.

If the young of a brood are isolated from adults they live together fairly harmoniously throughout the growing period. The recently hatched young have been seen to feed upon injured eggs, egg shells, and the bodies of injured earwigs. Any individual that becomes incapacitated in any way is quickly eaten by the others, but, in general, there is not a high mortality. However, when some members of the group become mature and females start ovipositing, the fighting instinct develops and there is a rapid diminution in numbers. Many of the survivors are crippled in various ways.

One group of 64 earwigs that hatched during the period February 21-23 was confined in a petri dish, with an abundance of food, until May 15. At that time there were 52 still alive, of which three were adult males, 22 adult females, and 27 immature individuals. Many of the earwigs had broken forceps, fragmentary legs, and short antennae. The average number of segments in the antennae for the entire group was slightly less than 10. Practically all of this injury had occurred within the 10 days preceding the taking of the record. If the group had been confined for 10 days longer there probably would have been few survivors.

In fighting, the forceps play an important part in the method of attack. The prey is first grasped near one end of the body by means of the forceps, then it is seized near the other end with the mandibles, and its body is instantly torn into two parts. The entrails are consumed immediately, after which most of the other body parts are eaten also. If the victim is another earwig, frequently the only remains are the forceps and some of the other more heavily chitinized parts. The females are particularly vicious fighters, although the males also have been seen to attack and kill other full grown individuals.

FOOD HABITS

In commenting upon the food habits of the ring-legged earwig, Gurney stated in a letter that actual damage to food plants is unusual and that the species is definitely known to be predaceous. Swezey (9) emphasized its predatory habits and stated that in Hawaii it is an aid in the control of the sugar cane leafhopper, *Perkinsiella saccharicida* Kirk. Williams (10) reported that the species is generally abundant in Hawaii, and, although it has a wide range of food materials, it prefers insects. During years when the cane leafhopper is abundant the earwig is said to feed almost exclusively on that pest. Pallister (8) found it abundant under lights at Mobile, Alabama, where it was feeding on various insects attracted thereto.

On the other hand, Lyle (5 and 6) reported damage to sweet potatoes and Irish potatoes in storage. Klostermeyer (4) observed the insect to feed "on

grain and to some extent on stored grain insects" in Nebraska. He also quoted R. C. Smith of Kansas State College as saying this earwig is a common pest of flour mills in Kansas.

In the Ohio greenhouse in which the infestation was first observed, the insects were found under various kinds of debris, such as the clover and manure mulch left from preceding crops. Some were found actively feeding on radishes and others were around and underneath radishes that were freshly injured.

Crickets and sowbugs were abundant underneath the old mulch material where the earwigs were taken and probably these organisms were also a source of food. Both sowbugs and crickets were killed and their bodies eaten when confined with earwigs in cages in the laboratory. On one occasion in which 20 earwigs and 25 sowbugs were placed in each of two large petri dishes, with an abundance of sliced carrots as vegetable food material, 16 of the sowbugs were killed and eaten within 24 hours. After 9 days, only 9 of the sowbugs remained alive from the original 50. During this period the earwigs had decreased in number from 40 to 36. The only observed remains of the dead bodies of either earwigs or sowbugs were some of the more heavily chitinized portions of the exoskeleton. During this 9-day interval considerable portions of the carrot material were consumed also.

In Ohio greenhouses, radish is the only plant or plant material that has been observed to be injured by the ring-legged earwig. The most severe injury occurred during the winter of 1936-1937, but damage in varying degrees has been observed during each of the four succeeding years. The amount of damage caused in any one year has not been estimated but has been sufficient to cause some commercial loss and to warrant the use of control measures.

The injury caused by earwigs to radish is distinctive and unlike that produced by any other insects. However, damage caused by the variegated cutworm, *Lycophotia margaritosa saucia* Hubn., is somewhat similar. The two types of feeding can be distinguished readily inasmuch as cutworm injury is more shallow and usually covers more of the radish surface (fig. 5).

Fig. 5.—Injury to radish caused by variegated cutworm, *Lycophotia margaritosa saucia* Hubn.

LABORATORY FEEDING RECORDS

In the laboratory, earwigs were reared without difficulty in petri and stender dishes which had a layer of plaster of Paris, or screened muck and plaster of Paris in the bottom. The plaster of Paris served to retain moisture and prevent the food from drying out. The muck served to give a darker color to the base. When vegetables were used as food, they were distributed in sliced form in the rearing chamber. Fresh material was supplied as needed.

Both young and adults fed readily on a number of vegetable and animal foods. Individuals were reared from egg to adult on carrot, potato, radish, and live aphids. Others fed for as long as 4 to 6 weeks on sweet potato, radish leaves, and boiled hen's eggs. On the other hand, the young insects developed but slowly, if at all, on meat scraps, fish meal, brown sugar, slices of apple, and on dried skimmilk.

Half-grown and adult earwigs seemed to have a wider range of food than did the newly hatched young. The critical period in feeding tests occurred in the first and second instars. In many instances the young died without making a single moult when restricted to certain foods; whereas half-grown individuals fed and developed satisfactorily on the same materials. Of all the food materials tested, carrot gave the most satisfactory results for all stages of the insect.

TABLE 2.—Development record for earwigs fed on carrot

Earwig No.	Days spent in various instars						Days from hatching to fifth moult
	1st	2nd	3rd	4th	5th	Adult*	
1	15	11	14	28	46		114
2	15	11	10	16	21		73
3	12	12	12	16	died		
4	12	11	11	15	24		73
5	11	11	15	12	20		69
6	12	11	13	12	10		58†
7	14	12	15	13	13		67
8	12	9	12	19	15		67
9	14	12	15	11	13		65‡
10	12	12	12	15	died		
Mean	12.9	11.2	12.9	15.7	20.3		73.3

*Length of adult life was not determined.
†Individual number 6 moulted a sixth time 15 days after fifth moult.
‡Individual number 9 moulted a sixth time 28 days after fifth moult.

TABLE 3.—Development record for earwigs fed on Irish potato

Earwig No.	Days spent in various instars						Days from hatching to fifth moult
	1st	2nd	3rd	4th	5th	Adult*	
1	16	18	16	23	22		95
2	16	15	12	12	8		63
3	17	19	10	8	died		
4	18	13	14	14	14		73
5	17	12	9	13	22		73
6	18	12	12	12	15		69
7	22	14	10	13	14		73
8	20	12	12	15	14		73
9	14	12	missing				
10	19	13	13	10	18		73†
Mean	17.7	14.0	12.0	13.3	15.9		74.0

*Length of adult life was not determined.
†Individual number 10 moulted a sixth time 11 days after the fifth moult.

In a growth study of earwigs fed on two different food materials, 10 newly hatched earwigs were given carrot and 10 Irish potato. It was found that in each lot all but two reached maturity, and that there was but little difference between the lots in the time required to complete growth. However, as shown in tables 2 and 3, development on carrot was much more rapid during the first two instars than it was on potato. In the late instars the condition was reversed.

INSECTICIDE CONTROL

The behavior of the ring-legged earwig is such that the use of poisoned baits seemed to offer the best chance of control. Accordingly, experiments were confined to tests with such materials.

In early experiments it was found that when a number of individuals, including adults, were grouped together as a unit, some mortality always occurred in the check groups due to the cannibalistic habits of the species, particularly of the adults. When partly grown individuals only were used, but little mortality occurred in the control lots. Later, in experiments conducted with adults, each earwig was isolated to form a single unit of the experiment. In similar experiments with partly grown earwigs, five individuals were grouped together as a unit. During the course of control studies, many tests were conducted with both mature and immature stages.

The control experiments fell into two groups. In the one group, different poisons were used with the same bait (molasses-bran) in order to ascertain the most effective toxic agent. In the other group, Paris green was used with different kinds of baits in order to determine the best attractant.

The feeding tests were conducted in stender dishes approximately 2¼ inches in diameter and 1 inch deep. About ½ teaspoonful of the poisoned bait was placed in each dish. Slices of carrot were also supplied so that satisfactory unpoisoned food was always available. The earwigs were exposed to the baits for a period of 4 to 7 days, after which the mortality record was taken. If the bait became moldy it was replaced with fresh material. The experiments were conducted in the laboratory at a temperature fluctuating around 75° F. with a relative humidity of 40 to 45 per cent. The data from two of the more representative experiments are presented.

The experiment with different toxic agents was conducted on immature earwigs or nymphs, using five individuals to a unit. Each treatment was replicated seven times. In all instances the proportions of materials used were 12 ounces of the toxicant to 12 pounds of bran, 2 quarts of molasses, and 6 quarts of water. In preparing the poisoned baits the molasses and water were first mixed together, then the insecticide was added, and the resulting mixture was poured over and mixed with the bran. The mortality record is given in table 4.

TABLE 4.—Earwig mortality from different toxic agents mixed with a molasses-bran bait

Treatments	Per cent mortality							
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Mean
Sodium fluoride-molasses-bran	40	20	0	60	20	60	20	31
Ground derris root-molasses-bran	20	20	40	0	0	40	0	17
Dutrox-molasses-bran	20	0	40	20	0	0	40	17
Paris green-molasses-bran	100	20	100	80	80	60	60	71
Check, carrot only	0	20	60	20	0	20	0	17

This experiment indicated that Paris green was the most effective of the toxic materials tested. The Paris green-bran-molasses bait consistently gave higher kills than the sodium fluoride-bran-molasses bait that has been recommended in Oregon for the control of the European earwig, *Forficula auricularia* L. (3).

In the experiment in which Paris green was used with different baits, separate tests were conducted on nymphs and adults. In the test with nymphs, as in the previous experiment, five earwigs were used as a unit and each treatment was replicated seven times. In the test with adults a single individual was used as a unit and each treatment was replicated 12 times. The mean results of the two experiments are given in table 5.

TABLE 5.—Earwig mortality resulting from a single toxic agent mixed with different baits

Treatments	Mean per cent mortality	
	Nymphs	Adults
Paris green, 1 part Brown sugar, 15 parts	83	92
Paris green, 1 part Meat scraps, 15 parts	89	83
Paris green, 1 part Dried skimmilk, 15 parts	89	75
Paris green, 1 part Fish meal, 15 parts	89	100
Check Carrot only	11	17

The results of these experiments indicate that all baits were effective. None was significantly better than any of the others. Inasmuch as the constituents of these baits varied from a high protein content through a combination of carbohydrate and protein to pure carbohydrate, it can be seen that this earwig accepted a wide range of food materials.

In other experiments, various combinations of baits and insecticides were tested. A summation of the results from all materials used is given in table 6.

It may be noted from table 6 that in nearly all instances in which Paris green was used as a toxicant a fairly high kill of earwigs was obtained. Although the highest kill in the series of experiments resulted from a treatment in which fish meal was used as the bait, when all treatments in which fish meal was used are considered, the kill was practically equivalent to that resulting from the sugar baits. In the 11 experiments in which Paris green was combined with brown sugar, a mean kill of over 92 per cent resulted. However, more care must be exercised in distributing this mixture than the Paris green-bran-molasses bait. The latter can be distributed broadcast among growing plants; whereas, the Paris green-brown sugar bait must be applied to the soil only because it will cause injury to plants if particles are permitted to lodge on the foliage. Furthermore, a Paris green-bran-molasses bait is commonly applied in greenhouses for cutworm control and hence

TABLE 6.—Summation of results from poisoned bait experiments

Treatments	Number of tests	Number of earwigs used	Per cent mortality
Paris green, ¾ lb. Bran, 12 lb. Fish meal, 1⅛ lb. Water, 6 qt.	2	43	95.3
Paris green, 1 part Brown sugar, 15 parts	7	172	92.4
Paris green, 1 part. Brown sugar, 9 parts	4	78	92.3
Paris green, 1 part Fish meal, 15 parts	2	47	91.5
Paris green, 1 part Meat scraps, 15 parts	2	47	87.4
Paris green, 1 part Dried skimmilk, 15 parts	2	47	85.1
Paris green, ¾ lb. Bran, 12 lb. Molasses, 4 qt. Water, 6 qt.	2	43	81.4
Paris green, ¾ lb. Bran, 12 lb. Molasses, 2 qt. Water, 6 qt.	9	218	78.0
Paris green, ¾ lb. Bran, 12 lb. Fish meal, 1⅛ lb. Molasses, 2 qt. Water, 6 qt.	2	43	76.7
Paris green, 1 part Carrot pulp, 4 parts Meat scraps, 5 parts	2	47	72.3
Paris green, 6 gm. Bran, 90 gm. 2 hens' eggs (120 gm.)	2	47	63.8
Paris green, ½ lb. Bran, 30 lb. Molasses, 1 qt. Water, 10 qt.	1	25	56.0
Paris green, 1 part Carrot pulp, 4 parts Brown sugar, 5 parts	4	78	44.9
Sodium fluoride, ¾ lb. Bran, 12 lb. Molasses, 2 qt. Water, 6 qt.	2	60	26.7
Dutox, 1 part Carrot pulp, 4 parts Brown sugar, 5 parts	2	31	25.8
Dutox, ¾ lb. Bran, 12 lb. Molasses, 2 qt. Water, 6 qt.	2	60	21.7
Sodium fluoride, 1 part Carrot pulp, 4 parts Brown sugar, 5 parts	2	31	19.4
Ground derris root (4% rot.), ¾ lb. Bran, 12 lb. Molasses, 2 qt. Water, 6 qt.	1	35	17.1
Check Carrot only	10	228	9.6

growers are familiar with its use. As a result of these considerations and in spite of a slightly lower kill, the Paris green-bran-molasses bait seemed the most practicable means of earwig control in commercial greenhouses.

Accordingly, a treatment made up of Paris green 12 ounces, bran 12 pounds, molasses 2 quarts, and water 6 quarts was applied as a commercial test in the infested area of the greenhouse in which injury occurred. Within a week after the application had been made it was found that a high percentage of the earwig population had been eliminated. Sufficient evidence was obtained to indicate that the Paris green-bran-molasses bait furnished a satisfactory method of control for commercial usage.

CONCLUSION

The ring-legged earwig has now been under observation in the State for 5 years. During this period it has been known to occur in but two greenhouses and in only one of these has it caused significant damage. This occurred in 1937 before it was found that the Paris green-bran-molasses bait was a satisfactory control. Since that time the earwig has been present in small numbers only. Because of the apparent ease with which the insect can be controlled and because it is evident that it does not spread rapidly, it is not likely that the ring-legged earwig will become a serious pest of greenhouse crops. However, if uncontrolled it can cause specific damage. The formula recommended is Paris green 12 ounces, bran 12 pounds, molasses 2 quarts, and water 6 quarts. The bait should be broadcast in the evening at the rate of 1 pound to 4,000 square feet.

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